

Serial No. 09/996,557
Docket No. 2000-367314US

AMENDMENTS TO THE CLAIMS:

1. (Currently amended) An optical module comprising:

a ~~an~~ photoreceptive optical active element; and

an optical waveguide formed separately from said photoreceptive optical active element, said optical waveguide being optically coupled to said photoreceptive optical active element and including a spot-size conversion region, configured by gradually increasing ~~or reducing~~ the width or the thickness, or both, of said optical waveguide, at the end or inside of said optical waveguide adjacent to where said photoreceptive optical active element is coupled.

2-3. (Canceled)

4. (Previously presented) An optical module for coupling to an optical active element, said optical module comprising:

an optical waveguide having a spot-size conversion region at an end thereof adapted for coupling to the optical active element, or inside of said optical waveguide, said conversion region configured by gradually increasing or reducing the width or the thickness, or both, of said optical waveguide; and

an optical coupling part having a refractive index matching resin therein, said resin having the same-level refractive index as that of said optical waveguide, said optical coupling part being adapted to be positioned between said optical waveguide and the optical active

Serial No. 09/996,557
Docket No. 2000-367314US

element.

5. (Previously presented) An optical module comprising first and second optical active elements; and an optical waveguide having spot-size conversion regions, wherein:

said optical waveguide comprises a Y-type branch optical waveguide having a single-mode waveguide section branched into first and second branch waveguide sections,

said optical active elements include a light-emitting element optically coupled to said first branch waveguide section, and a photoreceptive element optically coupled to said second branch waveguide section; and

said spot-size conversion regions include:

a first spot-size conversion region configured by reducing the width or the thickness, or both, of said waveguide on the light-emitting element side thereof, said first spot-size conversion region being provided at the end or inside of said first branch waveguide section; and

a second spot-size conversion region configured by increasing the width or the thickness, or both, of said waveguide on the photoreceptive element side thereof, said second spot-size conversion region being provided at the end or inside of said second branch waveguide section.

6. (Previously presented) The optical module according to claim 5, further comprising a refractive index matching resin having the same-level refractive index as that of said single-mode waveguide, said resin being adapted to be between said single-mode waveguide section

Serial No. 09/996,557
Docket No. 2000-367314US

and an optical fiber.

7. (Previously presented) An optical module comprising first and second optical active elements; and an optical waveguide having spot-size conversion regions, wherein:

said optical waveguide comprises a Y-type branch optical waveguide having a single-mode waveguide section branched into first and second branch waveguide sections;

said optical active elements include a light-emitting element optically coupled to said first branch waveguide section, and a photoreceptive element optically coupled to said single-mode waveguide section;

said spot-size conversion regions include:

a first spot-size conversion region configured by reducing the width or the thickness, or both, of said waveguide on the light-emitting element side thereof, said first spot-size conversion region being provided at the end or inside of said first branch waveguide section; and

a second spot-size conversion region configured by increasing the width or the thickness, or both, of said waveguide on the photoreceptive element side thereof, said second spot-size conversion region being provided at the end or inside of said single-mode waveguide section; and

said optical module further comprises a device for separating lights of different wavelengths, said device being between said single-mode waveguide section and the Y branch, said device reflecting light of a first wavelength, which is emitted from said light-emitting element, towards said second branch waveguide section, and of transmitting light of

Serial No. 09/996,557

Docket No. 2000-367314US

a second wavelength, different from said first wavelength, which is guided by said second branch waveguide section, toward said single-mode waveguide section.

8. (Previously presented) The optical module according to claim 7, further comprising a refractive index matching resin having the same-level refractive index as that of said second branch waveguide, said resin being adapted to be between said second branch waveguide section and an optical fiber.

9. (Previously presented) The optical module according to claim 4, further comprising an optical active element coupled to said optical waveguide.

10. (Previously presented) The optical module according to 9, wherein said optical active element comprises a light-emitting element.

11. (Previously presented) The optical module according to claim 9, wherein said optical active element comprises a photoreceptive element.

12-15. (Canceled)

16. (Currently amended) An optical module, comprising:

a Y-type branch optical waveguide having a single-mode waveguide section branched into a first and second branch waveguide sections, each waveguide section, adapted to be

Serial No. 09/996,557
Docket No. 2000-367314US

coupled to ~~an~~ a photoreceptive optical active element, and a second branch waveguide section, adapted to be coupled to a second optical element; and

optical coupling parts having a refractive index matching resin therein, said resin having the same-level refractive index as that of said optical waveguide, said optical coupling parts being adapted to be positioned between said optical waveguide and the optical active elements, wherein:

_____ said first branch waveguide section includes a first spot-size conversion region configured by increasing at least one of the width and the thickness of said waveguide, said first spot-size conversion region being provided at the end or inside of said first branch waveguide section; and

_____ said second branch waveguide section includes a second spot-size conversion region configured by decreasing at least one of the width and the thickness of said waveguide, said second spot-size conversion region being provided at the end or inside of said second branch waveguide section.

17-19. (Canceled)

20. (Currently amended) The ~~An~~ optical module according to claim 16, further comprising:

_____ a Y type branch optical waveguide having a single mode waveguide section branched into first and second branch waveguide sections, each waveguide section adapted to be coupled to an optical active element;

Serial No. 09/996,557
Docket No. 2000-367314US

~~optical coupling parts having a refractive index matching resin therein, said resin having the same level refractive index as that of said optical waveguide, said optical coupling parts being adapted to be positioned between said optical waveguide and the optical active elements; and~~

a device for separating lights of different wavelengths, said device being between said single-mode waveguide section and the Y branch, said device reflecting light of a first wavelength, which is guided by a first one of said waveguide sections, towards a second one of said waveguide sections, and of transmitting light of a second wavelength, different from said first wavelength, which is guided by said second one of said waveguide sections, toward a third one of said ~~single-mode~~ waveguide sections.

21-23. (Canceled)

24. (Currently amended) A method of forming an optical module, said method comprising:

providing ~~an a~~ photoreceptive optical ~~active~~ element;
providing an optical waveguide; ~~separately from the optical active element; and~~
optically coupling the optical waveguide to the photoreceptive optical ~~active~~ element,
wherein the optical waveguide includes a spot-size conversion region configured by gradually increasing ~~or reducing~~ the width or the thickness, or both, of the optical waveguide at the end or inside of the optical waveguide adjacent to where the photoreceptive optical ~~active~~ element is coupled.

Serial No. 09/996,557
Docket No. 2000-367314US

25. (Currently amended) The method of claim 24, further comprising positioning an optical coupling part between the optical waveguide and the photoreceptive optical active element, the optical coupling part having therein a refractive index matching resin having the same-level refractive index as that of the optical waveguide.